

CLAIMS

What is claimed is:

1. A card cage system for an electronic equipment enclosure, the card cage system suitable for use with one or more functional modules that each include a corresponding card joined to a front panel that includes fasteners, and the card cage system comprising:

- (a) first and second end card guides disposed within the electronic equipment enclosure;
- (b) a middle card guide interposed between the first and second end card guides in a spaced apart arrangement and cooperating with the first and second end card guides to define at least one card storage level; and
- (c) first and second adapter elements joined to the first and second end card guides, respectively, and a third adapter element configured to be removably joined to the middle card guide, the adapter elements cooperating with the card guides so that a first card storage configuration is defined when the adapter elements are joined to the corresponding card guides, and a second card storage configuration being defined when adapter elements are present in only two of the card guides.

2. The card cage system as recited in claim 1, wherein the second card storage configuration is defined when adapter elements are present only in the first and second end card guides.

3. The card cage system as recited in claim 1, wherein the first and second end card guides and the middle card guide cooperate to define two card storage levels.

4. The card cage system as recited in claim 1, wherein in the first card storage configuration, the middle card guide and end card guides are collectively configured to receive, at the at least one card storage level, only cards with dimensions conforming to a first card size, and wherein in the second card storage configuration, the middle card and end card guides are collectively configured to receive, at the at least one card storage level, only cards with dimensions conforming to a second card size.

5. The card cage system as recited in claim 1, wherein in the first card storage configuration, the middle card guide and end card guides are collectively configured to receive, at the at least one card storage level, only single-wide cards.

6. The card cage system as recited in claim 1, wherein in the second card storage configuration, the middle card guide and end card guides are collectively configured to receive, at the at least one card storage level, only cards wider than single-wide cards.

7. The card cage system as recited in claim 1, wherein the first and second end card guides and the middle card guide are substantially identical.

8. The card cage system as recited in claim 1, wherein in the first card storage configuration, the middle card guide and end card guides are collectively configured to receive, at the at least one card storage level, at least one double height or larger card.

9. The card cage system as recited in claim 1, wherein the first and second adapter elements are integral with the first and second end card guides, respectively.

10. The card cage system as recited in claim 1, wherein the first and second adapter elements are configured to be removably joined to the first and second end card guides, respectively.

11. The card cage system as recited in claim 1, wherein the card guides each define at least one channel configured to receive a portion of an edge of a functional module card.

12. The card cage system as recited in claim 1, wherein the adapter elements each define at least one channel configured to receive a portion of an edge of a functional module card.

13. The card cage system as recited in claim 1, wherein the adapter elements are each configured to engage at least one fastener of one of the functional modules.

14. The card cage system as recited in claim 1, further comprising means for substantially preventing relative motion of the adapter elements when the adapter elements are fastened to the card guides.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
80 EAST SOUTH ST. #100
SALT LAKE CITY, UTAH 84111

15. A card cage system for an electronic equipment enclosure, the card cage system suitable for use with one or more functional modules that each include a corresponding card, and the card cage system comprising:

- (a) first and second end card guides disposed within the electronic equipment enclosure;
- (b) a middle card guide interposed between the first and second end card guides in a spaced apart arrangement and cooperating with the first and second end card guides to define at least one card storage level; and
- (c) means for facilitating definition of multiple card storage configurations, the means for facilitating definition of multiple card storage configurations facilitating definition of first and second card storage configurations at the at least one card storage level.

16. The card cage system as recited in claim 15, wherein in the first card storage configuration the middle card guide and end card guides are collectively configured to receive, at the at least one card storage level, only cards of a first card size, and wherein in the second card storage configuration, the middle card guide and end card guides are collectively configured to receive, at the at least one card storage level, only cards of a second card size.

17. The card cage system as recited in claim 15, wherein the means for changing a card storage configuration aids in the retention of at least one card at the at least one card storage level.

18. The card cage system as recited in claim 15, wherein the means for changing a card storage configuration supports a received card in the first card storage configuration.

19. The card cage system as recited in claim 15, wherein in the first card storage configuration, the means for changing a card storage configuration permits the card guides to receive cards of a first card size, and prevents the card guides from receiving cards of a second card size.

20. The card cage system as recited in claim 15, wherein the means for changing a card storage configuration comprises an adapter element configured to be removably joined to the middle card guide.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
1000 EAGLE GATE TOWER
60 EAST SOUTH TEMPLE
SALT LAKE CITY, UTAH 84111

21. A card guide for use in an electronic equipment enclosure configured to receive one or more functional modules, each of which includes a corresponding card, the card guide having first and second sides and first and second ends and comprising:

- (a) first and second support structures that cooperate to at least partially define a pair of channels configured to receive at least a portion of a card, one channel being located on either side of the card guide, the channels terminating short of the first end of the card guide so that a slot is defined that is interposed between the first and second support structures, and the first and second support structures further cooperating to define a receptacle in communication with the slot so that in a first card storage configuration, a card received in the electronic equipment enclosure by way of the receptacle is positioned in the slot such that the card straddles the card guide;
- (b) a connecting member at least indirectly joined to one of the first and second support structures.

22. The card guide as recited in claim 21, wherein a second card storage configuration is defined when the receptacle is blocked, so that straddling of the card guide by a card received in the electronic equipment enclosure is substantially prevented.

23. The card guide as recited in claim 22, wherein in at least the second card storage configuration, the first and second support structures are collectively configured to receive, in each of the channels, respective portions of first and second cards positioned in the electronic equipment enclosure in a side-by-side arrangement.

24. The card guide as recited in claim 21, further comprising a third support structure, the first, second and third support structures cooperating to at least partially define two card storage levels.

25. The card guide as recited in claim 21, wherein at least one of the support structures comprises a web structure.

26. The card guide as recited in claim 21, further comprising a positioning member at least indirectly attached to one of the support structures.

27. The card guide as recited in claim 21, wherein the card guide substantially comprises injection-molded plastic.

28. The card guide as recited in claim 21, wherein the receptacle is configured to removably receive an adapter element, selective use of the adapter element facilitating definition of the first and second card storage configurations.

29. The card guide as recited in claim 21, wherein the card guide is configured for use in both vertical and horizontal card cages.

30. An electronic equipment enclosure, comprising:
- (a) a chassis; and
 - (b) a card cage system substantially disposed within the chassis and comprising:

the card cage system comprising:

- (i) first and second end card guides;
 - (ii) a middle card guide interposed between the first and second end card guides in a spaced apart arrangement and cooperating with the first and second end card guides to define at least one card storage level; and
 - (iii) first and second adapter elements joined to the first and second end card guides, respectively, and a third adapter element configured to be removably joined to the middle card guide, the adapter elements cooperating with the card guides so that a first card storage configuration is defined when the adapter elements are joined to the corresponding card guides, and a second card storage configuration being defined when adapter elements are present in only two of the card guides.
31. The electronic equipment enclosure as recited in claim 30, wherein the second card storage configuration is defined when adapter elements are present only in the first and second end card guides.

32. The electronic equipment enclosure as recited in claim 30, wherein the first and second end card guides and the middle card guide cooperate to define two card storage levels.

33. The electronic equipment enclosure as recited in claim 30, wherein in the first card storage configuration, the middle card guide and end card guides are collectively configured to receive, at the at least one card storage level, only cards with dimensions conforming to a first card size, and wherein in the second card storage configuration, the middle card and end card guides are collectively configured to receive, at the at least one card storage level, only cards with dimensions conforming to a second card size.

34. The electronic equipment enclosure as recited in claim 30, wherein in the first card storage configuration, the middle card guide and end card guides are collectively configured to receive, at the at least one card storage level, only single-wide cards.

35. The electronic equipment enclosure as recited in claim 30, wherein in the second card storage configuration, the middle card guide and end card guides are collectively configured to receive, at the at least one card storage level, only cards wider than single-wide cards.

36. The electronic equipment enclosure as recited in claim 30, further comprising a functional module configured to be received at the at least one card storage level when the first card storage configuration is defined.

37. The electronic equipment enclosure as recited in claim 30, further comprising a functional module configured to be received at the at least one card storage level when the second card storage configuration is defined.

38. The electronic equipment enclosure as recited in claim 30, wherein the card cage comprises one of: a vertical card cage; and, a horizontal card cage.

39. The electronic equipment enclosure as recited in claim 30, further comprising means for substantially preventing relative motion of the adapter elements when the adapter elements are fastened to the card guides.

40. The electronic equipment enclosure as recited in claim 30, wherein the card cage is configured to receive at least one of: a double height or larger functional module; and, a double wide or wider functional module.

41. The electronic equipment enclosure as recited in claim 30, wherein reconfiguration of the card cage can be achieved without disassembling the chassis.

WORKMAN NYDEGGER
A PROFESSIONAL CORPORATION
ATTORNEYS AT LAW
110 EAGLE GATE TOWER
SALT LAKE CITY, UTAH 84111